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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/990,377	11/23/2001	Qiang Li	215752US20	2849

22850 7590 05/19/2005	EXAMINER
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ART UNIT	PAPER NUMBER
2623	

DATE MAILED: 05/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
Office Action Summary	09/990,377	LI ET AL.
	Examiner	Art Unit
	Mehrdad Dastouri	2623

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>13 October 2004</u>.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

    1.☐ Certified copies of the priority documents have been received.

    2.☐ Certified copies of the priority documents have been received in Application No. _____.

    3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

1.   The Declaration filed on August 11, 2004, under 37 CFR 1.131 is sufficient to

overcome the Giger et al. reference (U.S. 2001/0043729 A1).

Claim Rejections - 35 USC § 102

2.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> ((b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3.   Claims 1-3, 5, 9, 11-14, 17-19 are rejected under 35 U.S.C. 102(b) as being

clearly anticipated by Nishikawa et al., (hereinafter Nishikawa), U.S. 6,058,322.

As per Claim 1, Nishikawa teaches:

obtaining a medical image having a candidate abnormality (Figure 1, Step 10);

segmenting the candidate abnormality in the medical image (Figure 1, Step 20;

Figures 4-10; Column 7, Lines 61-63; Column 8, Lines 34-46; Column 9, Lines 11-62);

extracting at least one predetermined feature from the segmented candidate

abnormality (Figure 1, Step 30; Column 3, Lines 13-20; Column 7, Lines 63-65; Column

8, Lines 47-67, Column 9, lines 1-10; Column 17, Lines 7-67, Column 18Lines 1-67

(e.g., Size, Contrast and Shape Irregularity of Microcalcifications); Figure 26; Column

33, Lines 62-67; Column 34, Lines 1-67);

comparing the candidate abnormality with plural database abnormalities

including known malignant abnormalities and known benign abnormalities (Table 1,

Databases "A", "B", "1" and "2", Columns 21 and 23; Figures 27A-B), including

comparing the at least one extracted feature(such as Size, Contrast and Shape

Irregularity of Microcalcifications) from the at least one candidate abnormality with

corresponding extracted features extracted from the database abnormalities (Column

24, Lines 3-67, Column 25, lines 1-10; Column 32, lines 29-67, Column 33, lines 1-61).

identifying, based on the comparing step, at least one database malignant

abnormality and at least one database benign abnormality having similarity to the

candidate abnormality (Column 32, lines 29-67, Column 33, lines 1-61; Figure 27A,

Malignant cases 150 and Benign cases 160; Figure 27B; Column 35, Lines 28-67,

Column 36, Lines1-29); and

displaying the at least one database malignant abnormality and the at least one

database benign abnormality having similarity to the candidate abnormality identified in

the identifying step (Figure 27B; Column 35, Lines 28-67, Column 36, Lines1-29).

As per Claim 2, Nishikawa teaches:

extracting at least one feature from the group comprising effective diameter,

contrast, degree of irregularity, pixel standard deviation, radial gradient index (RGI), and

computed tomography (CT value)(Column 17, Lines 7-67, Column 18, Lines 1-24).

As per Claims 3 and 5, they recite substantially the same limitations as Claim 2

above, except they recite, "extracting at least two features" (Column 8, Lines 47-67,

Column 9, lines 1-10; Table 1; Column 17, Lines 7-67, Column 18, Lines 1-24; Degree

of Circularity and Degree of Irregularity) and "extracting at least three features (Column

8, Lines 47-67, Column 9, lines 1-10; Table 1; Column 17, Lines 7-67, Column 18, Lines

1-24; Degree of Circularity, Degree of Irregularity and Contrast).

As per Claim 9, Nishikawa teaches:

using a region growing technique (Column 9, Lines 29-35).

As per Claim 11, Nishikawa teaches:

using an artificial neural network (ANN) (Figure 13; Column 32, Lines 1-20); and

determining a similarity measure based on an output of the ANN (Figure 13;

Column 32, Lines 1-20).

As per Claim 12, Nishikawa teaches:

using an ANN having at least three levels (input, hidden, output, Figure 13).

As per Claim 13, Nishikawa teaches:

identifying at least one similar malignant database abnormality and at least one

benign abnormality based on an output of the ANN (Figures 27A-B); and

displaying the database abnormalities identified in the identifying step (Figures

27A-B; Column 35, Lines 11-67, Column 36, Lines 1-29).

As per Claim 14, Nishikawa teaches:

wherein the displaying step comprises displaying at least one candidate

abnormality with at least one malignant abnormality and at least one benign abnormality

on a common display (Figures 27A-B; Column 35, Lines 11-67, Column 36, Lines 1-29).

As per Claim 17, Nishikawa teaches:

displaying at least one candidate abnormality with at least one malignant

abnormality and at least one benign abnormality on a common display ((Figures 27A-B;

Column 35, Lines 11-67, Column 36, Lines 1-29).

As per Claims 18/1, 18/5, 18/9, 18/11-14 and 18/17, arguments analogous to those presented for Claims 1-3, 5, 9, 11-14 and 17 are applicable.

As per Claims 19/1, 19/5, 19/9, 19/11-14 and 19/17, arguments analogous to those presented for Claims 1-3, 5, 9, 11-14 and 17 are applicable.

Claim Rejections - 35 USC § 103

4.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishikawa as applied to Claim 1.

5.   As per Claim 10, Nishikawa teaches:

region growing based on rough and precise thresholding (Column 9, Lines 23-44) but does not explicitly disclose region growing from a point included in a manually generated outline.

However, It would have been obvious to one of ordinary skill in the art to select region growing around the abnormality region of interest manually following the same automatic procedure taught by Nishikawa to achieve similar segmentation.

6.   Claims 4, 6, 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishikawa as applied to Claim 1 above and Komiya et al., (hereinafter Komiya), U.S. 5,754,676.

As per Claim 4, it narrows Claim 3 even further by limiting the two features to effective diameter and CT value, which Nishikawa does not specifically teach the use of effective diameter or CT value.

However, Komiya teaches determining the length of the contour of a malignant or benign tumor (Column 20, Lines 6-15, 49-50), this data clearly could be used by one of ordinary skill in the art to determine an "effective" diameter. Also, Komiya teaches conducting a CT test, Column 21, Line 13, which would return a result that could be classified as a CT value.

Therefore, It would have been obvious to one of ordinary skill in the art to use the contour line data and a result from the CT test of Komiya as one of the inputs into Nishikawa's neural network in order to determine malignancy or benignancy of a detected mass.

As per Claim 6, it recites the same limitations as Claim 4 above except it also includes the RGI feature as taught by Nishikawa (Column 9, Lines 29-35). It would have been obvious to one of ordinary skill in the art to use the contour line data and a result from the CT test of Komiya as one of the inputs into Nishikawa's neural network in order to determine malignancy or benignancy.

As per Claim 8, Nishikawa does not explicitly disclose obtaining a CT medical image.

However, Komiya teaches conducting a CT test, Column 21, Line 13, which is based on a CT medical image.

It would have been obvious to one of ordinary skill in the art to modify Nishikawa's invention according to the teachings of Komiya to obtain a CT medical image because it is a conventional digital image input for medical image processing.

7.   Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishikawa, as applied to Claim 11 above, and further in view of Guha, U.S. 5,373,452.

As per Claim 15, Nishikawa does not teach that a subjective rating is used in the determination of similarity. However, Guha teaches using such a feature in a neural network environment. Therefore, Guha teaches:

training the ANN based on at least one subjective similarity rating (Column 1, Lines 14-22, Column 4, Lines 26-35).

It would have been obvious to one of ordinary skill in the art to use the subjective intangible property of Guha as one of the inputs into the neural network of Nishikawa to capture the relationship between the subjective property and measurable physical properties of the feature under test because neural network models are inherently fault tolerant due to the distributive fashion in which they represent data (Guha, Column 1, Lines 51-55).

As per Claim 16, Guha teaches:

using an ANN trained at least in part by means of at least one subjective similarity rating (Column 4, Lines 41-44.)

8.   Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over

Nishikawa, as applied to claim 1 above, and further in view of Cabib et al. (hereinafter

Cabib), US 5784162.

As per claim 7, Nishikawa does not explicitly teach an absolute difference

determination between a candidate and reference feature. However, Cabib teaches:

calculating at least one similarity measure based on an absolute difference

between at least one extracted feature (pixel wavelength spectrum) of the candidate

abnormality and at least one corresponding feature of a database abnormality

(reference spectrum) (Column 9, Lines 28-32, 45-48).

It would have been obvious to one of ordinary skill in the art to use the spectral

pixel features as taught by Cabib as a feature to be extracted in the system of

Nishikawa because of the increased signal-to-noise ratio in spectral measurements thus

allowing for better extraction of image shapes and more accurate classification.

Contact Information

9.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Mehrdad Dastouri whose telephone number is (571)

272-7418. The examiner can normally be reached on Monday to Friday from 8:00 a.m.

to 4:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Amelia Au can be reached on (571) 272-7414. The fax phone number for

the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the

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you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

                                               MEHRDAD DASTOURI
                                               PRIMARY EXAMINER

Mehrdad Dastouri
Primary examiner
Art Unit 2623
April 11, 2005